

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Cancelled)
2. (Previously Presented) A cleaning device as set forth in claim 5,
wherein

said first wiping member is designed to move between said retracted position and said wiping position located above said retracted position, by moving a cleaner lever, and

1 said second wiping member is arranged above said retracted position and below said wiping position.

3. (Previously Presented) A cleaning device as set forth in claim 5, wherein said cleaner lever has a third wiping member which is able to contact with said second wiping member while said cleaner lever is moving.

4. (Previously Presented) A cleaning device for cleaning a nozzle surface of an ink-jet head, comprising:

a first wiping member for wiping said nozzle surface;

a cleaner lever for supporting said first wiping member;

a lever driving mechanism moving said first wiping member between a retracted position located away from said nozzle surface and a wiping position for wiping said nozzle surface;

a flat plate form second wiping member formed of an elastic body arranged within a moving path of said first wiping member so as to contact with said first wiping member;

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

a first supporting member supporting said second wiping member on the side of the retracted position of said first wiping member; and

a second supporting member supporting said second wiping member on the side of said wiping position of said first wiping member;

wherein a length of a portion of said second wiping member projecting from said first supporting member is greater than a length of a portion of said second wiping member projecting from said second supporting member.

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5. (Currently Amended) A cleaning device for cleaning a nozzle surface of an ink-jet head, comprising:

a first wiping member for wiping said nozzle surface;

a cleaner lever for supporting said first wiping member;

a lever driving mechanism moving said first wiping member along a first moving path between a retracted position located away from said nozzle surface and a wiping position for wiping said nozzle surface; and

a flat plate form second wiping member formed of an elastic body arranged within ~~a moving path of~~ said first moving path wiping member so as to contact with said first wiping member; and

a carriage carrying said ink-jet head for reciprocally moving along a second moving path through a printing region and a cleaning position where said ink-jet head opposes to said first wiping member, a direction of the second moving path being different from that of the first moving path,

wherein a tip end surface of said first wiping member first comes in substantially perpendicular contact with a side surface of said surface of second wiping member and then moves across said side surface.

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Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

6. (Previously Presented) A cleaning device for cleaning a nozzle surface of an ink-jet head, comprising:

a first wiping member for wiping said nozzle surface;

a cleaner lever for supporting said first wiping member;

a lever driving mechanism moving said first wiping member between a retracted position located away from said nozzle surface and a wiping position for wiping said nozzle surface; and

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a flat plate form second wiping member formed of an elastic body arranged within a moving path of said first wiping member so as to contact with said first wiping member;

wherein said lever driving mechanism includes:

a rotary driving source;

a gear train to be driven by said rotary driving source;

a friction type clutch lever which is frictionally engaged with one of gears constituting said gear train by means of a predetermined biasing force and is arranged coaxially with said gear;

a first cam mechanism for converting rotation of said clutch lever into movement of said cleaner lever; and

a tooth portion formed on said clutch lever which engages with said gear train when said clutch lever is in a predetermined rotational angular range.

7. (Original) A cleaning device as set forth in claim 6, wherein said tooth portion engages with said gear train when said first wiping member is being moved in a condition contacting with said second wiping member.

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

8. (Original) A cleaning device as set forth in claim 6, wherein said first cam mechanism includes a first cam follower formed in said cleaner lever, a first cam surface contacting with said first cam follower while said cleaner lever moves to said wiping position, and a second cam surface contacting with said first cam follower while said cleaner lever moves to said retracted position, and wherein said first and second cam surfaces are arranged at a predetermined angle with respect to each other.

9. (Original) A cleaning device as set forth in claim 6, further comprising a lock lever for locking said ink-jet head at a predetermined position, wherein said lever driving mechanism includes a second cam mechanism for converting a rotational force of said rotary driving source into a driving force for moving said lock lever between a locking position for fixing said ink-jet head and an unlocking position away from said ink-jet head.

10. (Original) A cleaning device as set forth in claim 9, wherein said first cam mechanism includes a first cam follower formed in said cleaner lever, said first cam follower following a first cam region for reciprocally moving said cleaner lever between said wiping position and said retracted position according to rotation of said clutch lever, and a second cam region for holding said cleaner lever at said retracted position even when said clutch lever is rotated, and
said second cam mechanism includes a second cam follower formed in said lock lever, said second cam follower following a third cam region for reciprocally moving said lock lever between said locking position and said unlocking position according to rotation of said clutch lever, and a fourth cam region for holding said lock lever at said unlocking position even when said clutch lever is rotated.

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

11. (Original) A cleaning device as set forth in claim 10, wherein while said first cam follower is operated in said first cam region, said second cam follower is in said fourth cam region, and when said first cam follower is moved into said second cam region, said second cam follower is shifted into operation in said third cam region.

12. (Original) A cleaning device as set forth in claim 10, wherein said second cam region is defined by an arc shaped cam groove centered at a rotational center of said clutch lever, and

said fourth cam region is defined by an arc shaped groove centered at rotational center of said clutch lever.

13. (Original) A cleaning device as set forth in claim 9, further comprising an ink pump device for sucking ink from ink nozzles of said ink-jet head; wherein said rotary driving source is a motor for driving said ink pump device.

14. (Previously Presented) A cleaning device for cleaning a nozzle surface of an ink-jet head, comprising:

a first wiping member for wiping said nozzle surface;
a cleaner lever for supporting said first wiping member; and
a lever driving mechanism moving said first wiping member between a retracted position located away from said nozzle surface and a wiping position for wiping said nozzle surface; wherein said lever driving mechanism includes:

a rotary driving source;
a gear train to be driven by said rotary driving source;

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

a friction type clutch lever which is frictionally engaged with one of gears constituting said gear train by means of a predetermined biasing force and is arranged coaxially with said gear;

cam mechanism converting rotation of said clutch lever into movement of said cleaner lever; and

a tooth portion formed on said clutch lever which engages with said gear train when said clutch lever is in a predetermined rotational angular range.

15. (Original) A cleaning device as set forth in claim 14, wherein said cam mechanism includes a first cam follower formed in said cleaner lever, a first cam surface contacting with said first cam follower while said cleaner lever moves to said wiping position, and a second cam surface contacting with said first cam follower while said cleaner lever moves to said retracted position, and wherein said first and second cam surfaces are arranged at a predetermined angle with respect to each other.

16. (Original) A cleaning device as set forth in claim 14, wherein said cam mechanism includes a cam follower formed in said cleaner lever, said cam follower following a first cam region for reciprocally moving said cleaner lever between said wiping position and said retracted position according to rotation of said clutch lever, and a second cam region for holding said cleaner lever at said retracted position even when said clutch lever is rotated.

17. (Original) A cleaning device as set forth in claim 16, wherein said second cam region is defined by an arc shaped cam groove centered at a rotational center of said clutch lever.

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

18. (Original) A cleaning device for cleaning a nozzle surface of an ink-jet head, comprising:

a lock lever for locking said ink-jet head at a predetermined position; and, a lever driving mechanism for moving said lock lever between a locking position for fixing said ink-jet head and an unlocking position away from said ink-jet head, wherein

said lever driving mechanism includes:

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a rotary driving source;
a gear train to be driven by said rotary driving source;
a friction type clutch lever which is frictionally engaged with one of gears constituting said gear train by means of a predetermined biasing force and is arranged coaxially with said gear;

cam mechanism for converting rotation of said clutch lever into movement of said lock lever; and

a tooth portion formed on said clutch lever which engages with said gear train when said clutch lever is in a predetermined rotational angular range.

19. (Original) A cleaning device as set forth in claim 18, wherein
said cam mechanism includes a cam follower formed in said lock lever, said cam follower following a third cam region for reciprocally moving said lock lever between said locking position and said unlocking position according to rotation of said clutch lever and a fourth cam region for holding said lock lever at said unlocking position even when said clutch lever is rotated.

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

20. (Original) A cleaning device as set forth in claim 19, wherein said fourth cam region is defined by an arc shaped groove centered at rotational center of said clutch lever.

21. (Original) A cleaning device for cleaning a nozzle surface of an ink-jet head, comprising:

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a first wiping member for wiping said nozzle surface;
a cleaner lever for supporting said first wiping member;
a lock lever for locking said ink-jet head at a predetermined position; and
a lever driving mechanism which moves said first wiping member between a retracted position located away from said nozzle surface and a wiping position for wiping said nozzle surface, and moves said lock lever between a locking position for fixing said ink-jet head and an unlocking position away from said ink-jet head, wherein

said lever driving mechanism includes:

a rotary driving source;
a gear train to be driven by said rotary driving source;
a friction type clutch lever which is frictionally engaged with one of gears constituting said gear train by means of a predetermined biasing force and is arranged coaxially with said gear;

a first cam mechanism for converting rotation of said clutch lever into movement of said cleaner lever; and

a second cam mechanism for converting rotation of said clutch lever into movement of said lock lever.

Appl. No. 09/828,812
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

22. (Original) A cleaning device as set forth in claim 21, wherein said first cam mechanism includes a first cam follower formed in said cleaner lever, said first cam follower following a first cam region for reciprocally moving said cleaner lever between said wiping position and said retracted position according to rotation of said clutch lever, and a second cam region for holding said cleaner lever at said retracted position even when said clutch lever is rotated, and

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said second cam mechanism includes a second cam follower formed in said lock lever, said second cam follower following a third cam region for reciprocally moving said lock lever between said locking position and said unlocking position according to rotation of said clutch lever and a fourth cam region for holding said lock lever at said unlocking position even when said clutch lever is rotated.

23. (Original) A cleaning device as set forth in claim 22, wherein while said first cam follower is operated in said first cam region, said second cam follower is in said fourth cam region, and when said first cam follower is moved into said second cam region, said second cam follower is shifted into operation in said third cam region.

24. (Previously Presented) An ink-jet printer comprising:
an ink-jet head;
a cleaning device which is arranged offsetting from a printing region of said ink-jet head and is defined in any one of claims 2 to 23 and 25 to 42; and
a carriage carrying said ink-jet head for reciprocally moving along a moving path through said printing region and a position opposing to said cleaning device.

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

25. (Previously Presented) A cleaning device as set forth in claim 4, wherein

said first wiping member is designed to move between said retracted position and said wiping position located above said retracted position, by moving a cleaner lever, and

said second wiping member is arranged above said retracted position and below said wiping position.

26. (Previously Presented) A cleaning device as set forth in claim 4, wherein said cleaner lever has a third wiping member which is able to contact with said second wiping member while said cleaner lever is moving.

27. (Previously Presented) A cleaning device as set forth in claim 4, wherein said lever driving mechanism includes:

a rotary driving source;

a gear train to be driven by said rotary driving source;

a friction type clutch lever which is frictionally engaged with one of gears constituting said gear train by means of a predetermined biasing force and is arranged coaxially with said gear;

a first cam mechanism for converting rotation of said clutch lever into movement of said cleaner lever; and

a tooth portion formed on said clutch lever which engages with said gear train when said clutch lever is in a predetermined rotational angular range.

28. (Previously Presented) A cleaning device as set forth in claim 27, wherein said tooth portion engages with said gear train when said first

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

wiping member is being moved in a condition contacting with said second wiping member.

29. (Previously Presented) A cleaning device as set forth in claim 27, wherein said first cam mechanism includes a first cam follower formed in said cleaner lever, a first cam surface contacting with said first cam follower while said cleaner lever moves to said wiping position, and a second cam surface contacting with said first cam follower while said cleaner lever moves to said retracted position, and wherein said first and second cam surfaces are arranged at a predetermined angle with respect to each other.

30. (Previously Presented) A cleaning device as set forth in claim 27, further comprising a lock lever for locking said ink-jet head at a predetermined position, wherein

 said lever driving mechanism includes a second cam mechanism for converting a rotational force of said rotary driving source into a driving force for moving said lock lever between a locking position for fixing said ink-jet head and an unlocking position away from said ink-jet head.

31. (Previously Presented) A cleaning device as set forth in claim 30, wherein said first cam mechanism includes a first cam follower formed in said cleaner lever, said first cam follower following a first cam region for reciprocally moving said cleaner lever between said wiping position and said retracted position according to rotation of said clutch lever, and a second cam region for holding said cleaner lever at said retracted position even when said clutch lever is rotated, and

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

said second cam mechanism includes a second cam follower formed in said lock lever, said second cam follower following a third cam region for reciprocally moving said lock lever between said locking position and said unlocking position according to rotation of said clutch lever, and a fourth cam region for holding said lock lever at said unlocking position even when said clutch lever is rotated.

32. (Previously Presented) A cleaning device as set forth in claim 31, wherein while said first cam follower is operated in said first cam region, said second cam follower is in said fourth cam region, and when said first cam follower is moved into said second cam region, said second cam follower is shifted into operation in said third cam region.

33. (Previously Presented) A cleaning device as set forth in claim 31, wherein said second cam region is defined by an arc shaped cam groove centered at a rotational center of said clutch lever, and

said fourth cam region is defined by an arc shaped groove centered at rotational center of said clutch lever.

34. (Previously Presented) A cleaning device as set forth in claim 30, further comprising an ink pump device for sucking ink from ink nozzles of said ink-jet head; wherein

said rotary driving source is a motor for driving said ink pump device.

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

35. (Previously Presented) A cleaning device for cleaning a nozzle surface of an ink-jet head, comprising:

a first wiping member for wiping said nozzle surface;

a cleaner lever for supporting said first wiping member;

a lever driving mechanism moving said first wiping member between a retracted position located away from said nozzle surface and a wiping position for wiping said nozzle surface; and

a flat plate form second wiping member formed of an elastic body arranged within a moving path of said first wiping member so as to contact with said first wiping member;

wherein a tip end surface of said first wiping member first comes in substantially perpendicular contact with a side surface of said second wiping member and then moves across said side surface,

wherein said lever driving mechanism includes:

a rotary driving source;

a gear train to be driven by said rotary driving source;

a friction type clutch lever which is frictionally engaged with one of gears constituting said gear train by means of a predetermined biasing force and is arranged coaxially with said gear;

a first cam mechanism for converting rotation of said clutch lever into movement of said cleaner lever; and

a tooth portion formed on said clutch lever which engages with said gear train when said clutch lever is in a predetermined rotational angular range.

36. (Previously Presented) A cleaning device as set forth in claim 35, wherein said tooth portion engages with said gear train when said first

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

wiping member is being moved in a condition contacting with said second wiping member.

37. (Previously Presented) A cleaning device as set forth in claim 35, wherein said first cam mechanism includes a first cam follower formed in said cleaner lever, a first cam surface contacting with said first cam follower while said cleaner lever moves to said wiping position, and a second cam surface contacting with said first cam follower while said cleaner lever moves to said retracted position, and wherein said first and second cam surfaces are arranged at a predetermined angle with respect to each other.

38. (Previously Presented) A cleaning device as set forth in claim 35, further comprising a lock lever for locking said ink-jet head at a predetermined position, wherein

 said lever driving mechanism includes a second cam mechanism for converting a rotational force of said rotary driving source into a driving force for moving said lock lever between a locking position for fixing said ink-jet head and an unlocking position away from said ink-jet head.

39. (Previously Presented) A cleaning device as set forth in claim 38, wherein said first cam mechanism includes a first cam follower formed in said cleaner lever, said first cam follower following a first cam region for reciprocally moving said cleaner lever between said wiping position and said retracted position according to rotation of said clutch lever, and a second cam region for holding said cleaner lever at said retracted position even when said clutch lever is rotated, and

Appl. No. 09/828,312
Reply to Office Action of July 16, 2003

Attorney Docket No. 83020.0002

said second cam mechanism includes a second cam follower formed in said lock lever, said second cam follower following a third cam region for reciprocally moving said lock lever between said locking position and said unlocking position according to rotation of said clutch lever, and a fourth cam region for holding said lock lever at said unlocking position even when said clutch lever is rotated.

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40. (Previously Presented) A cleaning device as set forth in claim 39, wherein while said first cam follower is operated in said first cam region, said second cam follower is in said fourth cam region, and when said first cam follower is moved into said second cam region, said second cam follower is shifted into operation in said third cam region.

41. (Previously Presented) A cleaning device as set forth in claim 39, wherein said second cam region is defined by an arc shaped cam groove centered at a rotational center of said clutch lever, and

 said fourth cam region is defined by an arc shaped groove centered at rotational center of said clutch lever.

42. (Previously Presented) A cleaning device as set forth in claim 38, further comprising an ink pump device for sucking ink from ink nozzles of said ink-jet head; wherein

 said rotary driving source is a motor for driving said ink pump device.